CLIMATOLOGY OF THE MONTH.

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GENERAL CHARACTERISTICS.

On the north Pacific Coast there was much rain; the valleys of the Chehalis and Skyhomish were flooded, greatly to the detriment of property interests therein; temperature was somewhat above normal; there were violent winds at times which contributed to the destruction of several vessels and the loss of half a score or more of lives.

On the middle and south Pacific coasts the reverse conditions obtained. Cold, dry winds prevailed, and the temperature over middle and southern California and Arizona fell to a lower point than usual. The prolonged cold spells of the 3d–4th, 19th, 20th, 21st, and 22d caused more or less apprehension for the safety of citrus fruits and trees; later reports, however, showed that the damage was less than anticipated.

The weather of the Rocky Mountain and Plateau Region was colder than usual; the precipitation was mostly in the form of snow and somewhat less than the normal amount.

East of the Rocky Mountains cold weather with rain and snow prevailed on the 2d, 3d, 4th, and 5th. Freezing temperatures occurred as far south as Texas, the Gulf Coast, and Louisiana.

The remarkably low temperature of forty-three degrees below zero (—43°) was recorded at Havre on the morning of the 2d. Observer C. W. Ling in charge of that station writes concerning the phenomenon as follows:

> The range of temperature, 68° on the 3d, is the greatest daily range on record at this station for eighteen years past, and the temperature, 43° below zero on the 2d, is the lowest on record for this station for first decade of December, and also the lowest that has ever occurred at this station so early in the season. The total daily wind movement was 26 miles on the 1st and 8 miles on the 2d, 8 miles being the least total daily wind movement on record for this station.

Cloudy weather with occasional rain or snow prevailed east of the Mississippi River from the 8th to the 15th. Heavy fog interfered with navigation on the Great Lakes on the 9th and on the North Atlantic on the 10th.

On the 14th a cold wave appeared north of Montana, which gradually spread eastward and southward with rain, changing to sleet and snow on its front. The cold wave was preceded by a rain and snow storm throughout Kansas, Nebraska, and Missouri on the 13th and 14th, which continued for about eighteen hours. By the morning of the 16th the front of the cold wave had reached northern Texas, Oklahoma, Arkansas, Missouri, and Illinois; it was accompanied in many cases by a thunderstorm. The temperature fall was quite sharp, being as much as 40° in five hours, in some instances. Several deaths from cold were reported. Much damage, especially to electric wires, trees, and shrubbery, was done by the rain and sleet storm throughout northern Texas, Arkansas, western Tennessee, and Missouri on the 19th and 20th. It had been raining or snowing throughout this region since the 17th and at many places the rain froze as it fell, forming a thick coating of ice over exposed objects. The ice layer so formed was greatly augmented by the heavy fall of sleet that occurred on the night of the 19th. Wires broke under the load, trees were denuded of their limbs, and, according to press dispatches, at least three lives were lost by falling limbs.

Alternating clear and cloudy weather, with rain or snow at times, prevailed from the 21st until the end of the month. On the 31st a severe rain and snow storm passed over the upper Ohio Valley and the Middle States, the greatest financial loss being sustained in Pittsburg, where at least a foot of snow fell, completely wrecking the various systems of electric wires and temporarily blocking traffic on streets and street car lines.

The greatest fogginess during the month occurred from the 9th to the 12th in the Lake Region and on the north Atlantic Coast.

ATMOSPHERIC PRESSURE.

[In inches and hundredths.]

In December atmospheric pressure is generally greatest over the middle Plateau Region, where it averages about 30.25 inches. There is also a smaller area of relatively high pressure over western North and South Carolina, northern Georgia, and eastern Tennessee. Pressure is generally least in the St. Lawrence Valley and the north Pacific Coast. From both of these regions pressure decreases toward the permanent areas of low pressure in the north Atlantic Ocean and Bering Sea, respectively. In the United States there is generally an increase of pressure from November to December.

The distribution of mean atmospheric pressure reduced to sea level, as shown by mercurial barometers, not reduced to standard gravity, and as determined from observations taken daily at 8 a. m. and 8 p. m. (seventy-fifth meridian time), is shown by isobars on Chart IV. That portion of the reduction to standard gravity that depends on latitude is shown by the numbers printed on the right-hand border.

The distribution of mean pressure for the current month reduced to sea level does not differ in a marked degree from the normal.

Pressure was below normal over the middle plateau in November, 1897. The single area of high pressure inclosed by isobars varying from 30.15 to 30.30 inches, that generally appears in that region, was broken into two separate areas of 30.15 inches the greater of which covered Assiniboia and the Dakotas (see Chart IV, November REVIEW). The greatest increase in pressure during the current month was in the region above named, where, during last month, pressure was relatively low. Aside from the fact that pressure on the Pacific Coast, the Rocky Mountain, and Plateau Regions was much greater than usual there were no special features that call for remark. The pressure distribution on the Pacific Coast and Plateau Region was not favorable to precipitation over middle and southern California.

The numerical values of Table I should be consulted for additional details.

TEMPERATURE OF THE AIR.

[In degrees Fahrenheit.]

The month was generally colder than usual. Unseasonable temperatures, with heavy frost in exposed places, occurred in southern California and Arizona on the 3d, and again on the 19th, 20th, 21st, and 22d, the cold of the last-named period being the most severe of the month. The temperature fell to 30° at Los Angeles on the morning of the 21st, a point as low as ever before recorded during December. The cold wave of the 3d–5th, east of the Rocky Mountains, overspread the plains region and Texas, moving eastward from the latter point into Louisiana by the morning of the 5th. Snow and sleet prevailed over northern Texas and snow flurries over the interior of Louisiana. The temperature in these regions fell to the lowest point reached during the month. The first killing frost and ice of the season at New

Orleans were observed on the morning of the 5th. On the 14th an area of high pressure appeared north of Montana. It gradually spread southward and eastward reaching the middle Mississippi Valley by the morning of the 16th, the Texas Coast by the morning of the 17th, and the north Atlantic Coast during the 18th. The temperature gradients in front of the advancing cold were rather steep and the advent of colder weather was marked by sharp squall winds with rain, sleet, or snow. While there were no severe cold waves during the month, there were frequent alternations from warm to cold, or from rain to snow and sleet.

The mean temperatures and the departures from the normal, as determined from records of the maximum and minimum thermometers, are given in Table I for the regular stations of the Weather Bureau, which also gives the height of the thermometers above the ground at each station. The mean temperature is given for each station in Table II, for voluntary observers.

The *monthly mean temperatures* published in Table I, for the regular stations of the Weather Bureau, are the simple means of all the daily maxima and minima; for voluntary stations a variety of methods of computation is necessarily allowed, as shown by the notes appended to Table II. The mean temperatures given in Table III for Canadian stations are the simple means of 8 a. m. and 8 p. m. simultaneous observations.

The *regular diurnal period* in temperature is shown by the hourly means given in Table V for 29 stations selected out of 82 that maintain continuous thermograph records.

The *distribution of the observed monthly mean* temperature of the air over the United States and Canada is shown by the dotted isotherms on Chart IV; the lines are drawn over the Rocky Mountain Plateau region, although the temperatures have not been reduced to sea level, and the isotherms, therefore, relate to the average surface of the country occupied by our observers; such isotherms are controlled largely by the local topography, and should be drawn and studied in connection with a contour map.

The *years of highest and lowest mean temperatures* for December are shown in Table I of the REVIEW for December, 1894. The mean temperature for the current month was neither the highest nor the lowest on record at any regular station of the Weather Bureau at which observations have been made for a period of twenty years or more.

The *maximum and minimum temperatures* of the current month are given in Table I. The highest maxima were: 89, Los Angeles (29th); 83, Key West (3d), Jupiter (22d); 82, San Luis Obispo (30th); 80, Jacksonville (4th), San Diego (13th). The lowest maxima were: 40, Duluth (9th); 41, Idaho Falls (8th); 44, Moorhead (29th); 45, Sault Ste. Marie (9th), Moorhead (29th); 46, St. Paul, Minneapolis, La Crosse, Greenbay, and Dubuque (9th). The highest minima were: 51, Key West (28th); 49, Jupiter (29th); 40, Tampa (9th); 39, Charleston (26th), San Francisco (22d); 38, Port Eads (5th). The lowest minima were: —43, Havre (2d); —31, Miles City (3d); —26, Williston (2d); —21, Lander (16th); —20, Huron (4th).

In Canada.—Prof. R. F. Stupart reports:

Highest maxima: Kingston, 55; Port Dover, 58; Paris, 57; Niagara, 61; Yarmouth, 57.

Lowest maxima: Prince Albert, Qu'Appelle, Port Arthur, Father Point, 38; White River, 37; Winnipeg, 33; Minnedosa, 34.

Highest minima: Esquimalt, 29; Agassiz, 15; Halifax, 7; Yarmouth, 10; Sydney, 4.

Lowest minima: Edmonton, —42; Battleford, Prince Albert, —34; White River, —43.

The *years of highest maximum and lowest minimum temperatures* for December are given in the last four columns of Table I of the REVIEW for December, 1896. During the current month the maximum temperatures were equal to or above the highest on record at: Eastport*, 54; Vineyard Haven, 62; Pensacola, 76; Port Eads, 77; Los Angeles, 89. The minimum temperatures were equal to or below the lowest on record at: Amarillo, —1; Fresno, 23; Los Angeles, 30.

The *greatest daily range of temperature and the data for computing the extreme and mean monthly ranges* are given for each of the regular Weather Bureau stations in Table I. The largest values of the greatest daily ranges were: Havre, 68; Huron, 58; Pierre, 55; Pueblo, 51; San Luis Obispo, 49; Lander, 47; Cheyenne, 45. The smallest values were: Fort Canby, 13; Tatoosh Island, Pysht, 14; Seattle and Tacoma, 15; Astoria, 16; San Francisco and Key West, 17.

Among the *extreme monthly ranges* the largest were: Havre, 94; Miles City, 82; Rapid City, 77; Williston, Bismarck, Pierre, 75. The smallest values were: Tatoosh Island, 16; Fort Canby, 19; Port Angeles, 22; Astoria, 23; Pysht, San Francisco, 24; Seattle, 25.

Considered by districts the mean temperatures of the current month show departures from the normal as given in Table I. The greatest positive departures were: North Pacific, 1.1; South Atlantic and Florida Peninsula, 1.0 each. The greatest negative departures were: Upper Mississippi, 5.0; Missouri Valley, 4.8; middle Slope, 4.4; middle plateau, 4.2.

In Canada.—Professor Stupart says:

There was nothing especially remarkable about the distribution of mean temperature. Throughout British Columbia, the Northwest Territories, Manitoba, the Lake Superior district, northern Ontario, and northern Quebec it was a little below average, and over southern Ontario, southern Quebec, and in the Maritime Provinces it was a little above. The greatest departures reported were: 4° below average at White River, Ont., and 4° above at Chatham, N. B.

Accumulated monthly departures from normal temperatures from January 1 to the end of the current month are given in the second column of the following table, and the average departures are given in the third column, for comparison with the departures of current conditions of vegetation from the normal condition.

Districts.	Accumulated departures.		Districts.	Accumulated departures.	
	Total.	Average.		Total.	Average.
	°	°		°	°
New England	+ 5.5	+ 0.5	Florida Peninsula	— 0.4	0.0
Middle Atlantic	+ 4.0	+ 0.3	Northern Slope	— 0.1	0.0
South Atlantic	+ 5.5	+ 0.5	Southern Plateau	— 7.5	— 0.6
East Gulf	+ 8.4	+ 0.7	Middle Plateau	— 8.8	— 0.7
West Gulf	+11.0	+ 0.9	Middle Pacific	— 5.6	— 0.5
Ohio Valley and Tenn.	+ 8.6	+ 0.7	South Pacific	— 9.0	— 0.8
Lower Lake	+ 7.5	+ 0.6			
Upper Lake	+15.9	+ 1.3			
North Dakota	+ 2.8	+ 0.2			
Upper Mississippi Valley	+ 9.7	+ 0.8			
Missouri Valley	+ 8 9	+ 0.7			
Middle Slope	+ 8.4	+ 0.7			
Northern Plateau	+ 7.8	+ 0.6			
North Pacific	+ 0.1	0.0			
Southern Slope	0.0	0.0			

FROST.

At the end of the month freezing temperatures had occurred in all parts of the country, except on the immediate Pacific Coast, the delta of the Mississippi, and the Florida Peninsula. In the last-named, light to heavy and killing frosts occurred over the northern half of the peninsula in exposed places. The isotherms of 32° and 40°, on the snowfall Chart VI, show the southerly limits of the regions that have suffered frost or freezing weather.

PRECIPITATION.

[In inches and hundredths.]

On the whole, December, 1897, was not far from a normal month as regards precipitation. There was more than the

* Observations cover a period of twenty-five years, or more.